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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/973,294	10/09/2001	Abram M. Castro	117821-130	6011

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EXAMINER

PATEL, ISHWARBHAI B

ART UNIT	PAPER NUMBER
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2827

DATE MAILED: 08/14/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/973,294

Applicant(s)

CASTRO ET AL.

Examiner

Ishwar (I. B.) Patel

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 09 May 2003.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,3-8 and 10-19 is/are pending in the application.
- 4a) Of the above claim(s) 10-18 and 21-23 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,3-8 and 19 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 09 May 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

Election/Restrictions

1. Applicant's confirmation of election without traverse of group I, claims 1-9 and 19-23 is acknowledged.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

3. Claims 1 and 3 are rejected under 35 U.S.C. 102(e) as being anticipated by Nakamura et al., US Patent No. 6,300,576, hereafter, Nakamura.

Regarding claim 1, Nakamura discloses a circuit board, comprising:

a first laminate made of a first dielectric material consisting essentially of a fiber-reinforced, cured thermosetting resin, a second laminate made of a second dielectric material consisting essentially of a fiber-reinforced, cured thermosetting resin heat-bonded to the first laminate along respective inner face thereof (insulating layers 3, see figures 1A, 1B and 9, column 4, line 57 to column 5, line 7),

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a plurality of exposed first electrical contacts on an outer face of the first laminate; a plurality of exposed second electrical contacts on an outer face of the second laminate (electrodes 1, see figures 1A, 1B and 9, column 4, line 57-65); and

a plurality of electrical conductors each running from a first contact to a second contact the conductors including elongated conductive lines extending along one of the first or second laminates and vias extending through the first and second laminates which have been filled with an electrically conductive filler (wiring electrode layer 4 and via hole conductor / conductive paste 2, see figures 1A, 1B and 9, column 4, line 57-65).

Regarding claim 3, Nakamura further discloses contacts configured as die pad and solder bond pads, see figure 9.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 4 and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nakamura, as applied to claims 1 and 3 above.

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Regarding claim 4, Nakamura discloses all the features of the claimed invention as shown above except the solder mask layer.

However, such mask layer is well known in the art for protecting the outer surfaces and also to avoid short circuit of the solder with the adjacent contacts.

A person of ordinary skill in art would use the known elements in the art to protect the outer conductor layer and also to avoid short circuit during assembly.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to provide the circuit board of Nakamura with the solder mask layers in order to avoid short circuit with the adjacent contacts and to protect the outer surface from damage.

Regarding claim 8, Nakamura further discloses all the features of the claimed invention including the third laminate, see figures 1A, 1B and 9.

Claim Rejections - 35 USC § 103

6. Claims 5 -7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nakamura as applied to claims 1,3 and 4 above, and further in view of Gallagher et al, US Patent No. 5, 948,533, hereafter Gallagher.

Regarding claim 5, the modified structure of Nakamura discloses all the features of the claimed invention except the via filler consist of essentially of a transient liquid phase sintering conductive adhesive.

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However, use of such material for electrical connection is known in the art.

Gallagher discloses such material to have a strong mechanical, thermal and electrical interconnect with good conductivity, and better resistant to humidity and temperature cycling.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to provide the modified circuit board of Nakamura with the via filler consisting essentially of transient liquid phase sintering material, apparently in order to have a strong mechanical, thermal and electrical interconnection with good conductivity, and better resistant to humidity and temperature cycling.

Further, it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. *In re Leshin*, 125, USPQ 416.

Regarding claims 6 and 7, Nakamura further discloses all the features of the claimed invention including electric conductors / planes, (electrode layers 4, which can be configured, as a power or ground conductors / plane, as required for the functionality of the system, see figures 1A, 1B and 9).

7. Claim 19 rejected under 35 U.S.C. 103(a) as being unpatentable over the modified circuit board of Nakamura as applied to claims 1, 2 and 4 above, and further in view of Huang et al., US Patent No. 6,359,341, hereafter Huang.

Regarding claim 19, Nakamura discloses all the features of the claimed invention except the heat sink having central opening bonded to the outer face of the first laminate.

However providing such heat sink made of metal plate is known in the art for dissipating the heat from the system.

Further, such plates also are used as shield or stiffener over and above dissipating the heat depending upon the specific requirements.

Huang discloses such structure to be used as a ground metallic layer and heat dissipation path.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to provide the modified circuit board of Nakamura with heat sink as taught by Huang in order to dissipate the heat from the system.

Response to Arguments

8. Applicant's arguments with respect to claims have been considered but are moot in view of the new ground(s) of rejection.

The new prior art of Nakamura discloses the insulating layer directly bonded to each other.

Conclusion

9. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Nakatani et al., discloses a circuit board structure with fiber reinforced thermosetting resin and via filled with conductive paste.

Otani et al., discloses semiconductor package with solder resist 9 on the substrate surface, see figure 4.

Rai et al., discloses a wiring board structure with solder resist 22, see figure 2.

Imasu et al., discloses a package with passivation films 5 and 6 of polyimide resin, see figure 2.

Yoneda discloses a mounting substrate with solder resist 20, see figure 1A.

10. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.


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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ishwar (I. B.) Patel whose telephone number is (703) 305 2617. The examiner can normally be reached on M-F (8:30 - 5).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David L Talbott can be reached on (703) 305 9883. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 305 3431 for regular communications and (703) 305 7724 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308 0956.

ibp
August 9, 2003



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